30 May 2000

GPSOS Unique SRD Version Two, Revision b List of Changes through 30 May 2000 since Version Two, Revision a 28 February 2000

CCBD 00019

1. SRDG 3.1.1.1-1

Current requirement: "Spurious multipath signals of Left Hand Circular Polarization (LHCP) shall be rejected by an additional 20 dB."
Change **to**: " Spurious multipath signals of Left Hand Circular Polarization (LHCP) shall not adversely effect sensor capability to meet EDR performance."

2. SRDG 3.1.6.2.5-6

Current requirement: "The GPSOS sensor contractor shall be responsible for the following elements of the GPSOS system:

1) Ground processing software and auxiliary ground data sources needed to convert SDRs into ionospheric, troposphere, and stratospheric EDRs.
2) Each GPSOS sensor identifies itself with a unique serial number and ROM code version number every time it boots."

Change **to**: "The GPSOS sensor contractor shall identify and demonstrate for the following elements of the GPSOS system:

1) Ground processing software and auxiliary ground data sources needed to convert SDRs into ionospheric, troposphere, and stratospheric EDRs.
2) Each GPSOS sensor identifies itself with a unique serial number and ROM code version number every time it boots."

3. SRDG 3.2.1.4-1

Current requirement: "A single, interchangeable GPSOS sensor data format shall conform to the DMSP/POES/METOP system format and data rate (TBS)."
Change **to**: "Deleted."

4. SRDG 3.2.3-2

Current requirement: "The GPSOS shall be compatible with and interface to selected risk-reduction flight-opportunity spacecraft (TBR). Potential flight-of-opportunity spacecraft for the GPSOS include the DMSP, the POES, and the METOP satellite series."
Change **to**: "The GPSOS shall be compatible with and interface to selected risk-reduction flight-opportunity spacecraft (TBR)."

CCBD 98065

Replace the *Original* table with the attached *Revised* table.

ORIGINAL

Para. No.		Thresholds	Objectives
G40.8.5-1	a. Horizontal Reporting Interval	(TBD) based on > 98% of all possible occultation events	100%
G40.8.5-2	b. Vertical Reporting Interval (Applicable to profile only))	10 km within 100 km of E/F peaks, 20 km elsewhere	5 km
	c. Horizontal Cell Size		
G40.8.5-3	1. 0-30° latitude	(TBD)	100 km
G40.8.5-4	2. 30-50° latitude	(TBD)	250 km
G40.8.5-5	3. 50-90° latitude	(TBD)	50 km
G40.8.5-6	d. Vertical Cell Size (Applicable to profile only)	10 km within 100 km of E/F peaks, 20 km elsewhere	5 km
G40.8.5-7	e. Horizontal Coverage	(TBD) based on > 98% of all possible occultation events	(TBD)
G40.8.5-8	f. Vertical Coverage	(TBD)	(TBD)
	g. Measurement Range		
G40.8.5-9	1. Density profile	$3x10^{5}$-10^{7} cm^{-3}	10^{4}-10^{7} cm^{-3}
G40.8.5-10	2. Slant path TEC	3-1000 TEC units (TBR)	1-1000 TEC units
	h. Measurement Uncertainty		
G40.8.5-11	1. Density profile	Greater of 20% or $3x10^{5}$ cm^{-3} (TBR)	10^{4} cm^{-3}
G40.8.5-12	2. HmF2	20 km	5 km
G40.8.5-13	3. HmE	(TBD)	(TBD)
G40.8.5-14	4. Slant path TEC	3 TEC units	1 TEC unit
G40.8.5-15	i. Maximum Local Average Revisit Time	(TBD)	(TBD)

REVISED

Para. No.		Thresholds	Objectives
G40.8.5-1	a. Horizontal Reporting Interval	1000 km	1000 km
	b. Vertical Reporting Interval (EDP)		
G40.8.5-2	1. ≤500 km altitude	10 km	3 km
G40.8.5-16	2. >500 km altitude	20 km	5 km
	c. Horizontal Cell Size (EDP)		
G40.8.5-3	1. 0-30° latitude	400 km	100 km
G40.8.5-4	2. 30-50° latitude	400 km	250 km
G40.8.5-5	3. 50-90° latitude	400 km	50 km
	d. Vertical Cell Size (EDP)		
G40.8.5-6	1. ≤500 km altitude	10 km	3 km
G40.8.5-17	2. >500 km altitude	20 km	5 km
G40.8.5-7	e. Horizontal Coverage	Global	Global
G40.8.5-8	f. Vertical Coverage (EDP)	90 -to- 800 km	90 -to- 1600 km
	g. Measurement Range		
G40.8.5-9	1. EDP	$3x10^4$ -to- 10^7 cm^{-3}	10^4 -to- 10^7 cm^{-3}
G40.8.5-10	2. Slant path TEC	3-1000 TECU	1-1000 TECU
	h. Measurement Uncertainty		
G40.8.5-11	1. EDP	Max{20%, $3x10^5$ cm^{-3}}	Max{5%, 10^4 cm^{-3}}
G40.8.5-12	2. H_mF_2	20 km	5 km
G40.8.5-13	3. H_mE	10 km	5 km
G40.8.5-14	4. Slant path TEC	3 TECU	1 TECU
G40.8.5-15	Deleted		

CCBD 00037

Change FROM:

SAE AS1773 Fiber Optics Mechanization of an Aircraft Internal Time Division
May 88 Command/Response Multiplex Data Bus

Change TO:

IEEE Std 1394a-2000 IEEE Standard for a High Performance Serial Bus-Amendment 1
May 31, 2000

CCBD 00029

Global clean-up to remove GLONASS requirements that are no longer needed, remove references to DMSP/POES/METOP for early flight opportunities which are N/A, and a few additional changes from GPSOS System Spec Review.

1) 1.2 SENSOR OVERVIEW

From:

The GPSOS sensor must satisfy GPSOS requirements for: a) the GPSOS-assigned Environmental Data Records (EDRs), b) the on-orbit determination of position and time, and c) the ground-processed Precise Orbit Determination (POD). The GPSOS sensor makes observations of navigation signals from the Global Navigation Satellite System (GNSS) consisting of the GPS and the GLONASS.

Two types of occultations are possible: rising and setting. A setting occultation starts when the combined orbital motions of the NPOESS satellite and one of the GPS or GLONASS satellites being tracked by the GPSOS sensor are such that the GPS or GLONASS satellite, as viewed from NPOESS satellites, drops below the NPOESS local horizontal plane and ends when the GPS or GLONASS satellite, as viewed from NPOESS, drops behind the Earth's limb. Setting occultations occur for GPS/GLONASS satellites that are in the hemisphere behind the NPOESS satellite (anti-velocity direction). A rising occultation is the inverse of a setting occultation. Rising occultations occur for GPS/GLONASS satellites in the hemisphere in front of the NPOESS satellite. Both setting and rising occultations are to be tracked by the GPSOS sensor. Tracking of rising occultations requires that the GPSOS sensor be capable of rapidly locking on the GPS/GLONASS signals as they appear from behind the Earth's limb.

To:
The GPSOS sensor must satisfy GPSOS requirements for: a) the GPSOS-assigned Environmental Data Records (EDRs), b) the on-orbit determination of position and time, and c) the ground-processed Precise Orbit Determination (POD). The GPSOS sensor makes observations of navigation signals from the Global Positioning System (GPS) constellation of spacecraft.

Two types of occultations are possible: rising and setting. A setting occultation starts when the combined orbital motions of the NPOESS satellite and one of the GPS being tracked by the GPSOS sensor are such that the GPS, as viewed from NPOESS satellites, drops below the NPOESS local horizontal plane and ends when the GPS satellite, as viewed from NPOESS, drops behind the Earth's limb. Setting occultations occur for GPS satellites that are in the hemisphere behind the NPOESS satellite (anti-velocity direction). A rising occultation is the inverse of a setting occultation. Rising occultations occur for GPS satellites in the hemisphere in front of the NPOESS satellite. Both setting and rising occultations are to be tracked by the GPSOS sensor. Tracking of rising occultations requires that the GPSOS sensor be capable of rapidly locking on the GPS signals as they appear from behind the Earth's limb.

2) 3.1.1 Sensor Description

From:
The GPSOS sensor is one of several sensors under development by the Integrated Program Office (IPO) for utilization by POES/DMSP and NPOESS era satellite constellations. The GPSOS sensor provides real-time, on-orbit positioning, timing, and acquires data to enable ground processing yielding precise orbit determination (POD), and occultation event phase/amplitude data to within the specifications listed below. The offeror's proposal addresses each of the areas and provides rationale and supporting analysis for all deviations. The Government desires to provide early NPOESS data to users by possibly flying one or more of the GPSOS sensors on POES and DMSP. This Sensor Requirement Document (SRD) for GPSOS defines the NPOESS GPSOS sensor requirements. The NPOESS era constellation is planned to contain 3 satellites: 2 US built and 1 built by EUMETSAT.

There will be approximately 5200 occultation events daily experienced by the NPOESS constellation using the GPS and GLONASS satellite signals. The GPSOS sensor measured occultation data will support determination of atmospheric vertical profiles of: a) ionospheric electron density, and b) provide tropospheric temperature, pressure, and moisture content (when merged with other ground-based data sensor data).

To:
The GPSOS sensor is one of several sensors under development by the Integrated Program Office (IPO) for utilization by the NPOESS. The GPSOS sensor provides real-time, on-orbit position and time and acquires data to enable ground processing yielding precise orbit determination (POD), and occultation event phase/amplitude data to within the specifications listed below. This Sensor Requirements Document (SRD) for GPSOS defines the NPOESS GPSOS sensor requirements. The NPOESS constellation is planned to contain 3 satellites: 2 US built and 1 built by the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT).

There will be approximately 2600 occultation events daily experienced by the NPOESS constellation using the GPS satellite signals. The GPSOS sensor-measured occultation data will support determination of atmospheric vertical profiles of: a) ionospheric electron density, and b) tropospheric temperature, pressure, and moisture content.

3) 3.1.1.1 General Sensor Characteristics

From:
The separate GPSOS components interface with the host satellite (DMSP/POES/METOP and NPOESS). There are several nadir viewing sensors on-board the satellite and the GPSOS sensors and antennas cannot interfere with DMSP/POES/METOP or NPOESS missions.There are additional concerns regarding potential multipath effects on the GPS/GLONASS signals attributable to the host satellite structure. The GPSOS antenna(s) design minimizes these multipath effects. Assuming a 0 dB antenna gain with GPS/GLONASS signals, the GPSOS receiver sensitivity requirement is estimated to be -130 dBm for Right Hand Circular Polarization (RHCP).

To:
The separate GPSOS components must interface with the NPOESS satellite. There are several nadir viewing sensors on-board the satellite and the GPSOS sensors and antennas cannot interfere with other NPOESS mission requirements.
There are additional concerns regarding potential multipath effects on the GPS signals attributable to the host satellite structure. The GPSOS antenna(s) design should minimize these multipath effects. Assuming a 0 dB antenna gain with GPS signals, the GPSOS receiver sensitivity requirement is estimated to be -130 dBm for Right Hand Circular Polarization (RHCP).

4) SRDG3.1.1.1-8

From:
Receiver data quality shall be sufficient to support troposphere/stratospheric occultation measurement analysis. The latter involves ground-based precise orbit determination using GPSOS data combined with non-NPOESS ground data (e.g., IGS) to determine the position and velocity of the NPOESS and GPS/GLONASS satellites. EDR values will be updated within 20 minutes of receipt of the data at the Central or Tactical site. The Navigation/POD and Troposphere/Stratosphere columns in Table 3.1.1.1 provide the requirements levied on the receiver associated with this analysis.

To:
Receiver data quality shall be sufficient to support troposphere/stratospheric occultation measurement analysis. The Navigation/POD and Troposphere/Stratosphere columns in Table 3.1.1.1 provide recommendations on receiver design needed to support this requirement.

5) SRDG3.1.1.1-10

From:
Nominal channels: 5-6 channels each, for navigation both GPS and GLONASS; 8 channels for GPS occultations, and 8 channels for GLONASS occultations. A single channel shall be defined as all observables associated with a single satellite at both L1 and L2 frequencies (GPS) or both L1 and L2 frequency bands (GLONASS). Note: Within the next 5-7 years, the GPS Block II F satellites may have an additional frequency, i.e., L5 at approximately 1140 MHz. The GPSOS sensor will utilize L5 capability to improve the delineation of the ionosphere refraction and navigational precision as a GPSOS sensor Preplanned Product Improvement (P3I) capability, when available.

To:
The GPSOS receiver shall have the following minimum number of channels: 5-6 channels for navigation/POD plus 8 channels for GPS occultations. A single channel is defined as all observables associated with a single satellite at both L1 and L2 frequencies (GPS). It is noted that within the next 5-7 years, the GPS Block II F satellites may have an additional frequency; that is, L5 at approximately 1140 MHz. The GPSOS sensor should utilize this L5 capability when available to improve the delineation of the ionosphere refraction and navigational precision as a Preplanned Product Improvement (P3I) capability.

6) SRDG3.1.1.1-14

From:

On a daily basis, > 98% (TBR) of the available occultation events (rising and setting for GPS and GLONASS) shall be measured, i.e., 98% (TBR) of the available occultation events within plus or minus 180 (TBR) degrees of the satellite's velocity vector.

To:
On a daily basis, > 98% (TBR) of the available occultation events (rising and setting for GPS) shall be measured; that is, 98% (TBR) of the available occultation events within plus or minus 180 (TBR) degrees of the satellite's velocity vector.

7) SRDG3.1.1.1-15

From:
The GPSOS shall have the ability to perform: on-orbit inter-frequency bias calibrations, calibrate hardware induced absolute channel delays on each channel, and calibrate the interchannel bias for both GPS and GLONASS.

To:
The GPSOS shall have the ability to perform on-orbit inter-frequency bias calibrations, hardware-induced absolute channel delay calibrations for each receiver channel, and inter-channel bias calibrations.

8) SRDG3.1.1.1-18

From:
GPSOS sensor shall be able to maintain track on occulted satellites (GPS and GLONASS) to within 5 km above the Earth's limb (setting occultations) and acquire track within 10 km (rising occultations) above the Earth's limb with a > 90% probability.

To:
GPSOS sensor shall be able to maintain track on occulted GPS satellites to within 5 km above the Earth's limb (setting occultations) and acquire track within 10 km (rising occultations) above the Earth's limb with a > 90% probability.

9) SRDG3.1.1.1-19

From:
The GPSOS shall use the GPS and GLONASS to perform its navigation function and to produce its assigned set of Primary and Secondary EDRs.

TO:
The GPSOS shall use the GPS to perform its navigation function and to produce its assigned set of Primary and Secondary EDRs.

10) SRDG3.1.6.1.2-1

From:
During launch and injection to the operational orbit, the GPSOS sensor shall be powered on unless recommended otherwise by the vendor in order to provide protection from the launch and injection environments. Specifically, the GPSOS sensor can support early anomaly resolution by providing navigational data to the satellite and is useful for monitoring satellite vehicle status.

To:
Deleted.

11) SRDG3.1.6.1.2-2

From:

Satellite telemetry, which includes GPSOS navigational data, shall be transmitted to ground monitoring stations to be used to the extent practicable during the injection phase.

To:
Deleted.

12) SRDG3.1.6.2.1-1
From:
The GPSOS is also a sensor with early flight opportunity potential on DMSP and POES. The above information describing NPOESS satellite orbital parameters is intended as guidance to the Contractor.

To:
Deleted.

13) SRDG3.1.6.2.3-2
From:
On-orbit storage of occulting and non-occulting satellite data for transmission to the satellite C3 subsystem shall be at variable rates dependent on the altitude of the GPS/GLONASS signal path above the Earth's surface (the "ray tangent altitude"). The GPSOS sensor sample rates are selectable by ground control commands selectable in each band between the defined limits in four atmospheric regimes/vertical profiles: a) troposphere – surface to 20 km @ 10-100 Hz; b) stratosphere to E region ionosphere – 20 km to 150 km @ 5-20 Hz; c) ionosphere – 150 km to 1000 km @ 0.5 to 5.0 Hz; and d) navigation @ 1.0 - 0.03 Hz. Data from these different regions is used in different ways during ground processing to produce different products as described below.

To:
The GPSOS shall be capable of variable sample rates dependent on the altitude of the GPS signal path above the Earth's surface (the "ray tangent altitude") and the measurement parameter. The GPSOS sensor sample rates should be as follows; a) troposphere – surface to 20 km @ 10-100 Hz; b) stratosphere to E region ionosphere – 20 km to 150 km @ 5-20 Hz; c) ionosphere – 150 km to 1000 km @ 0.5 to 5.0 Hz; d) ionospheric scintillation – 150 –700 km @ 100 – 1000 Hz, and e) navigation @ 1.0 - 0.03 Hz. Data for these distinct functions is used in different ways during ground processing to produce different products as described below.

Deleted: d

14) SRDG3.1.6.2.3-4
From:
Calculation of tropospheric/stratospheric EDRs (i.e., atmospheric temperature and water vapor profiles) involves determination of the atmospheric contribution to the observed GPS/GLONASS signal Doppler. However, prior to this determination, the observed signals are corrected for any clock errors associated with the GPSOS reference oscillator or the GPS/GLONASS satellite clocks. Clock errors within GPSOS are removed by use of a reference satellite.

To:
Deleted.

15) SRDG3.1.6.2.3-5
From:
This allows the use of the single-differencing data processing technique to correct GPSOS clock errors during ground processing. Clock errors in the GPS/GLONASS satellites are of one of two types: slow drift in the on-board atomic clocks (present for both GPS and GLONASS) and the intentionally induced errors associated with selective availability (GPS only). Apart from the effects of Selective Availability (S/A), the GPS and GLONASS satellite clocks are believed to be stable enough to allow accurate determination of EDRs without any corrections. With regard to the errors induced by S/A, other occultation sensors, i.e.,

GPS/MET has used data from ground-based GPS receivers in a double-differencing scheme to make the needed corrections.

Given the observations after correction for clock errors, the atmospherically induced Doppler is determined by subtracting the Doppler due to relative GPS/GLONASS-NPOESS satellite motion from the observed Doppler. Determining the Doppler due to satellite motions in turn requires high precision orbit determination for both GPS/GLONASS satellites and for NPOESS. High accuracy GPS and GLONASS ephemerides are obtained on the ground through processing of data from ground-based (non-NPOESS) GPS and GLONASS receivers, i.e., the IGS system. The high accuracy GPS/GLONASS ephemerides are then used together with GPSOS observations of non-occulted satellites to determine the high accuracy ephemeris for NPOESS.

To:
Deleted.

16) SRDG3.1.6.2.3-6

From:
Determination of electron density profiles and slant path Total Electron Content (TEC) from GPSOS data should involve one of two techniques, or some combination thereof. A single frequency method based on ray path bending is possible which involves considerations similar to those described above for the troposphere/stratosphere (correction of clock errors and subtraction of geometric Doppler). Alternately, a dual frequency scientific algorithm exists whereby line-of-sight TEC observations obtained from the differential pseudorange and phase are converted into a vertical electron density profile. Occultations which occur off to the side of the NPOESS satellite (out-of-track occultations) provide useful information for NPOESS end users, but can not be processed into vertical electron density profiles due to the substantial change in tangent point location during the occultation. Slant path TEC observations from these types of occultations should be produced as part of the GPSOS ground processing. Accurate measurement of TEC requires knowledge of the inter-frequency bias of both the GPSOS receiver and the transmitters on the GPS and GLONASS satellites.

To:
Deleted.

17) 3.2.1.1.3.1.1 Electron Density Profiles/Ionospheric Specification

From:
The ionosphere is that portion of the Earth's upper atmosphere which is composed of electrically charged particles (electrons and various ions). A complete vertical electron density profile would extend from the D and E regions at altitudes between 60 and 150 km, through the F region within which the electron density reaches a maximum value nominally between altitudes of 250-350 km, through the topside up to 3,000 km, and into the plasmasphere. The Air Force requires global ionospheric specification to meet a number of operational needs. Electron density profile measurements, to include measurements of various important parameters associated with a complete profile, are required as inputs to and to augment the outputs of operational ionospheric models. The GPSOS sensor data will be used to produce slant path (NPOESS to GPS/GLONASS satellite) total electron content (TEC) measurements for all occultation events. In addition, for occultation events which occur in viewing directions close to the spacecraft orbit plane (within TBR degrees of the velocity or anti-velocity vectors), the GPSOS sensor data will be used to produce vertical electron density profiles for altitudes below the NPOESS altitude. Profile measurements above the NPOESS altitude are not required. However, the GPSOS sensor data from non-occulting satellites will be used to produce slant path TEC observations of the topside/plasmasphere.

To:
The ionosphere is that portion of the Earth's upper atmosphere which is composed of electrically charged particles (electrons and various ions). A complete vertical electron density profile would extend from the D and E regions at altitudes between 60 and 150 km, through the F region within which the electron density

reaches a maximum value nominally between altitudes of 250-350 km, through the topside up to 3,000 km, and into the plasmasphere. The Air Force requires global ionospheric specification to meet a number of operational needs. Electron density profile measurements, to include measurements of various important parameters associated with a complete profile, are required as inputs to and to augment the outputs of operational ionospheric models. The GPSOS sensor data will be used to produce slant path (NPOESS to GPS satellite) total electron content (TEC) measurements for all occultation events. In addition, for occultation events which occur in viewing directions close to the spacecraft orbit, the GPSOS sensor data will be used to produce vertical electron density profiles for altitudes below the NPOESS altitude. Profile measurements above the NPOESS altitude are not required. However, the GPSOS sensor data from non-occulting satellites will be used to produce slant path TEC observations of the topside/plasmasphere.

18) 3.2.1.1.3.1.2 Ionospheric Scintillation

From:

Temporal and spatial fluctuations in ionospheric electron density lead to fading or disruption of trans-ionospheric communication and radar signals, a phenomenon known as scintillation. The extent of the effect depends on the relative motion of the ionosphere and the signal source, the frequency of transmission, and the amplitude and spectral characteristics of the ionospheric fluctuations. Direct measurements of scintillation in terms of amplitude and phase fluctuation indices S_4 and sigma-ø are required. Spectral analysis of amplitude and phase measurements is desirable as well.

Units:
S_4: Dimensionless
sigma-ø: radians

Para. No.		Thresholds	Objectives
G40.8.11-1	a. Horizontal Cell Size	(TBD)	50 km
G40.8.11-2	b. Horizontal Coverage	(TBD)	(TBD)
	c. Measurement Range		
G40.8.11-3	1. S_4	0.1-1.5	(TBD)
G40.8.11-4	2. sigma-ø	0.1-20 radians	(TBD)
	d. Measurement Uncertainty		
G40.8.11-5	1. S_4	0.1	(TBD)
G40.8.11-6	2. sigma-ø	0.1 radian	(TBD)
G40.8.11-7	e. Local Time Range	(TBD)	(TBD)

To:

Temporal and spatial fluctuations in ionospheric electron density lead to fading or disruption of trans-ionospheric communication and radar signals, a phenomenon known as scintillation. The extent of the effect depends on the relative motion of the ionosphere and the signal source, the frequency of transmission, and the amplitude and spectral characteristics of the ionospheric fluctuations. Direct measurements of scintillation in terms of amplitude and phase fluctuation indices S_4 and sigma-ø are required. Spectral analysis of amplitude and phase measurements is desirable as well.

Units:
S_4: Dimensionless
sigma-ø: radians

Para. No.		Thresholds	Objectives
G40.8.11-1	a. Horizontal Cell Size	deleted	deleted
G40.8.11-2	b. Horizontal Coverage	Global	Global
	c. Measurement Range		

G40.8.11-3	1. S_4	0.1-1.5	0.1 – 1.5
G40.8.11-4	2. sigma-ø (radians)	0.1-20	0.1 – 20
G40.8.11-8	3. GPS channels	L1	L1 & L2
G40.8.11-9	4. Sample rate (Hz)	100	1000
	d. Measurement Precision		
G40.8.11-5	1. S_4	0.1	0.1
G40.8.11-6	2. sigma-ø (radians)	0.1	0.1
G40.8.11-7	e. Local Time Range (hours of day)	0 – 24	0 – 24
G40.8.11-10	f. Vertical Coverage (km)	150 – 700	90 – 800

19) 3.2.1.1.8 GPSOS Interface to GPS and GLONASS Satellites

From:
3.2.1.1.8 GPSOS Interface to GPS and GLONASS Satellites

To:
3.2.1.1.8 GPSOS Interface to GPS Satellites

20) SRDG3.2.1.1.8-1

From:
The GPSOS shall demonstrate compatibility with the GPS (GPS ICD 200) and the GLONASS satellites and satellite constellations to the extent required for the GPSOS to perform its navigation function and to produce its assigned set of Primary and Secondary EDRs.

To:
The GPSOS shall demonstrate compatibility with the GPS (GPS ICD 200) to the extent required for the GPSOS to perform its navigation function and to produce its assigned set of Primary and Secondary EDRs.

21) SRDG3.2.1.4-1

From:
A single, interchangeable GPSOS sensor data format shall conform to the POES/DMSP/METOP system format and data rate (TBS).

To:
Deleted.

<u>22) 3.2.3 Interface Requirements</u>

From:
The GPSOS interface requirements include the NPOESS spacecraft and other risk-reduction Flight-of-Opportunity spacecraft including, but not necessarily limited to, the DMSP, the POES, and the METOP spacecraft. GPSOS interfaces to the GPS and GLONASS are described in Section 3.2.1.1.8.

To:
The GPSOS interface requirements include the NPOESS spacecraft. GPSOS interfaces to the GPS are described in Section 3.2.1.1.8.

23) SRDG3.2.3-2

From:
The GPSOS shall be compatible with and interface to selected risk-reduction Flight-of-Opportunity spacecraft (TBR). Potential Flight-of-Opportunity spacecraft for the GPSOS include the DMSP, the POES, and the METOP satellite series.

To:
Deleted.

24) SRDG3.2.4-1

From:
The GPSOS sensor shall have a mass less than or equal to 22 kg.

To:
The GPSOS sensor shall have a mass less than or equal to 30 kg.

25) SRDG3.2.4-2

From:
The GPSOS sensor shall have an average operating power less than or equal to 40 watts.

To:
The GPSOS sensor shall have an average operating power less than or equal to 52 watts.

26) SRDG3.2.4-3

From:
The GPSOS sensor shall have a total stowed volume of less than or equal to 27,000 cm^3 and a maximum footprint (stowed dimensions) for any single box of less than 760 cm^2, excluding antenna(s) and cabling. The sensor vendor should work with the integrating contractor, through the IPO, to accommodate the GPSOS, its antenna(s) and cabling.

To:
The GPSOS sensor shall have a total stowed volume of less than or equal to 40,000 cm^3 and a maximum footprint (stowed dimensions) for any single box of less than 760 cm^2, excluding antenna(s) and cabling. The sensor vendor should work with the integrating contractor, through the IPO, to accommodate the GPSOS, its antenna(s) and cabling.

CCBD		Page
00019	Unique Section GPSOS SRD Changes	9, 18, 24, 25
98065	Electron Density Profile (EDP)/Ionospheric Specification	21
00037	Replacement of 1773 by 1394	5
00029	Unique Section GPSOS SRD Changes	1, 9-11, 15, 16, 22, 24, 27

Deleted: SIZE BUDGETS:¶
¶
1. PDR Values (P-GOS-SPC-0002-SE, Issue 3, 08MAR99, Table 3.7-1)¶
¶
Length Width Height Volume Footprint¶
GEU 25.0 cm 23.0 cm 26.0 cm 14,950 cm^3 575 cm^2¶
GVA RCFU 14.0 16.5 9.5 2,195 231¶
GAVA RCFU 14.0 16.5 9.5 2,195 231¶
GZA RCFU 14.0 16.5 12.0 2,772 231¶
¶
Total Volume: 22,112 cm^3¶
Max Footprint: 568 cm^2¶
¶
2. Note: Current Values (P-GOS-SPC-0002-SE, Issue 7, 09MAR99, Table 3.7-1¶
¶
Length Width Height Volume Footprint¶
GEU 29 cm 25 cm 27 cm 19,575 cm^3 725 cm^2¶
GVA RCFU 17 22 13 4,862 374¶
GAVA RCFU 17 22 13 4,862 374¶
GZA RCFU 17 22 16 5,984 374¶
¶
Total Volume: 35,284 cm^3¶
Max Footprint: 725 cm^2¶
¶

Deleted: ????